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2812

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Paul D. Bradley

Serial No.: 10/752,661

Examiner: NGUYEN, Ha T.

Filing Date: January 6, 2004

Group Art Unit: 2812

Title: Electrostatic Discharge Protection of Thin-Film Resonators

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) **\$500.00**.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)(1)-(5)) for the total number of months checked below:

- | | | |
|--------------------------|--------------|-----------|
| <input type="checkbox"/> | one month | \$ 120.00 |
| <input type="checkbox"/> | two months | \$ 450.00 |
| <input type="checkbox"/> | three months | \$1020.00 |
| <input type="checkbox"/> | four months | \$1590.00 |

☐ The extension fee has already been filled in this application.

☒ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **50-1078** the sum of \$500.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **50-1078** pursuant to 37 CFR 1.25.

A duplicate copy of this transmittal letter is enclosed.

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☐ I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Date of Facsimile:

Typed Name: D. James Chung

Signature: 

Respectfully submitted,

Paul D. Bradley

By 

D. James Chung
Attorney/Agent for Applicant(s)

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Date: 04/25/2005

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application no.: 10/752,661 Confirmation No.: 4120
First Named Inventor: Paul D. Bradley
Filing Date: 01/06/2004 Art Unit: 2812
Examiner: NGUYEN, Ha T.
Docket no.: 10010890-5

APPELLANT'S BRIEF

On Appeal to the Board of Patent Appeals and Interferences

Mail Stop Appeal Brief
Commissioner for PATENTS
Washington, D.C. 20231

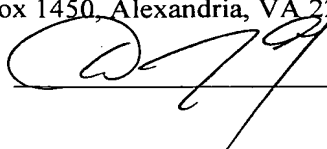
Sir/Madam:

In response to the Final Office Action mailed on December 13, 2004 finally rejecting Claims 1-6, the applicant appeals. This Appellant's Brief (the "Appeal Brief") is filed in triplicate in support of the Notice of Appeal submitted on February 24, 2005.

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Appeal Brief, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Date: 04/25/2005


D. James Chung

I. REAL PARTY IN INTEREST

The real party in interest is the assignee, Agilent Technologies, Inc., pursuant to an Assignment filed with U.S. Patent Application number 10/209,602 (hereinafter the "Parent Application") filed July 30, 2002 which is the parent application to the present divisional application. For the Parent Application, an Assignment was recorded on 01/27/2003, at Reel/Frame 013387/0956.

II. RELATED APPEALS AND INTERFERENCES

The present application is a divisional application from U.S. Patent Application number 10/209,602 ("Parent Application") filed July 30, 2002 having a first named applicant of Paul D. Bradley. The Parent Application is under an Appeal to the Board of Patent Appeals and Interferences (hereinafter the "BPAI" or the "Board") following a Final Rejection of its Claims.

Based on information and belief, there are no other appeals or interferences that could directly affect, be directly affected by, or have a bearing on the decision by the Board in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-12 were filed in the Parent Application. Claims 1-6 were cancelled via a Preliminary Amendment filed with the present Divisional Application leaving Claim 7-12 pending. Claims 7-12 have been finally rejected and are the subject matter of this appeal. Claim 7 is the sole independent claim that is pending. In accordance with 37 C.F.R. § 1.192(c)(9), a copy of the claims involved in this appeal is included in the Appendix attached hereto.

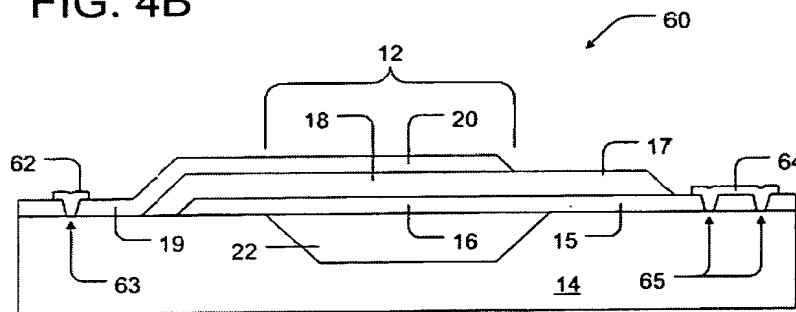
IV. STATUS OF THE AMENDMENTS

No amendments are made herein.

V. SUMMARY OF THE INVENTION¹

The present invention can be summarized with reference to Figures 4B and 4C of the present patent application reproduced below:

FIG. 4B



The present invention includes a “method for fabricating an apparatus, the method comprising: fabricating a thin-film resonator [12] on a substrate [14]; and fabricating a bonding pad [62] connected to said thin-film resonator [12], a portion of said bonding pad [62] in contact with the substrate [14] to form a Schottky diode [63].” Claim 7 (reference numbers added).

The result is an apparatus [60] that shunts high voltage spikes on the bonding pad [62], whereby resonator [12] is protected from the high voltage spike.

VI. ISSUES PRESENTED ON APPEAL

¹ The SUMMARY OF THE INVENTION section is to be read in light of the disclosure, and does not limit the claims. See MPEP Section 1206.

The first issue is whether or not Claims 7, 9, 11, and 12 were properly rejected 35 U.S.C. 102(a) as being anticipated by Ruby (U.S. Patent No. 5,873,153).

The second issue is whether or not Claims 8 and 10 were properly rejected under 35 U.S.C. 103(a) as being obvious over the same Ruby reference.

VII. GROUPING OF THE CLAIMS

Although the pending claims may stand together, they do not fall together. Claim 7 is the sole independent claim. Claims 8-12 depend, directly or ultimately, on Claim 7 and include limitations in addition to those of Claim 7.

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VIII. ARGUMENTS

A. ARGUMENTS REGARDING THE REJECTION UNDER 35 USC 102(b)

Claims 7, 9, 11-12 were rejected 35 U.S.C. 102(a) as being anticipated by Ruby (U.S. Patent No. 5,873,153). The applicant respectfully traverses.

“A claim is anticipated only if **each and every element** as set forth in the claim is found ... in a single prior art reference.” *Verdegall Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, USQP2D 1051 (Fed. Cir. 1987) (Emphasis added). In fact, for a valid rejection under 35 U.S.C. 102(b), “[t]he **identical invention** must be shown in as **complete detail** as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913 (Fed. Cir. 1989) (Emphasis added). Moreover, “**All words** in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494 (CCPA 1970) (Emphasis added).

The applicant respectfully submits that the Ruby reference fails to anticipate the rejected claims for failing to “each and every element” of the claims.

Firstly, the applicant respectfully submits that the Ruby reference fails to anticipate “bonding pad” of Claim 7. The examiner alleges that the Ruby reference’s via 303 is the “bonding pad” of Claims 7. The applicant respectfully traverses.

Claim 7 recites a step of “fabricating a bonding pad (62, 64).” Claim 7, reference numbers added. The bonding pad is typically a top-exposed layer on which wires are bonded to (thus, the name “bonding pad”) connect the device to a chip package. See, e.g., Stanley Wolf, *Silicon Processing for the VLSI Era, Volume 2 – Process Integration* (Lattice Press, 1990), p. 337 (herein after the “Wolf Treatise”).

In contrast, in the Ruby reference, it's via 303 is an opening through a temporary sacrificial layer 302. See, Ruby, Figure 11 and column 6. The via 303 is filled with metal to form a metallic column to support the device (FBAR 300) which is then suspended by removing the temporary sacrificial layer 302. Ruby, column 6, lines 37-40 and Ruby, Abstract, last sentence of the Abstract. In short, in the Ruby reference, it's via 303 and the metal filling is structural support columns for the FBAR 300, and not a "bonding pad" of Claim 7. Further, Ruby's via 303 or support columns 307 are not exposed for wire bonding. Accordingly, neither the Ruby's via 303 nor support columns 307 anticipates the "bonding pad" of Claim 7.

The examiner, citing the Wolf Treatise, dismisses the above analysis alleging that bonding pads and vias are equivalent:

"As shown by Wolf, a bonding pad is a metallized pattern, a via is a metallized pattern, the metallic via can function as a bonding pad in an application where it is bonded to another device."

Final Action, p. 3.

The applicant respectfully traverses. There is a clear, unambiguous distinction between a "bonding pad" and a "via" as taught even in the Wolf Treatise that the examiner cites. According to the Wolf Treatise, "bonding pads" are "**special metallization patterns** ... normally located in the periphery of the circuit." Further, "wires are connected (bonded) to the metal of the bonding pads." Wolf, Silicon Processing, p. 337, with an accompanying figure illustrating bonding pads (bold added). In contrast, "vias" are "**openings** in the intermetal dielectric layers [that] allow contact to be made between [metal layers] Metals 1 and 2, Metals 2 and 3, etc. [that is separated by the dielectric layer]." Wolf, Silicon Processing, pp. 188-189, with an accompanying figure illustrating, *inter alia*, vias (bold added).

As applied here, the examiner is attempting to equate bonding pads (metallization patterns) of Claim 7 with vias (openings) of the Ruby reference. The applicant respectfully submits that the vias (openings) of the Ruby reference do not anticipate the bonding pads (metallization patterns) of Claim 7.

Secondly, Claim 7 recites that “portion of said bonding pad (62, 64) in contact with the substrate (14) to form a Schottky diode.” Claim 7, reference numbers added. In contrast, the Ruby reference teaches neither the bonding pad in contact with its substrate nor formation of a Schottky diode.

The examiner alleges that the contact between Ruby’s via 303 and Ruby’s substrate 301 “inherently forms a Schottky diode.” The applicant traverses. Again, Ruby’s via 303 is not the “bonding pad” of Claim 7. Further, the rejection fails to meet *In re Robert*’s requirement for inherency which states that “[t]o establish inherency, the extrinsic evidence ‘**must make clear** that the missing descriptive matter is **necessarily present** in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The **mere fact that a certain thing may result from a given set of circumstances is not sufficient.**’” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (emphasis added). There is no extrinsic clear evidence that such Schottky diode is necessarily present at the junction of Ruby’s via 303 (an opening) and Ruby’s substrate 301.

As is thoroughly explained in the Wolf Treatise, a Schottky diode may result at a metal to semiconductor contact. However, normally, Schottky diodes are not formed in a metal to semiconductor contact:

“It is the **ohmic contact [non-Schottky contacts]** that is normally **fabricated for the purpose of interconnecting devices in an IC**. Non-ohmic, rectifying metal-semiconductor contacts (*Schottky contacts*) find some application in ICs.”

Wolf, *Silicon Processing*, p. 87, with accompanying figures illustrating, *inter alia*, characteristics of contacts (bold added, italics in the original).

Accordingly, under *In re Robertson*, the mere fact that a Schottky diode may result from a prior art reference given a special set of circumstances, this fact is not sufficient to anticipate Claim 7.

Finally, the examiner's allegations prove too much thus is untenable. The examiner essentially alleges that any and all contact between a metal conductor and a semiconductor substrate forms a Schottky diode:

“the examiner interprets that the metal contact 303 inherently forms a Schottky diode with the semiconductor substrate 301 (see col. 6, lines 26-29) ... a bonding pad is a metallized pattern, a via is a metallized pattern.”

Final Action, pp. 2 and 3.

Here, the examiner is essentially equating “bonding pads,” “vias,” and any contact between metal and semiconductor with Schottky diodes. Under this analysis, any and all metal patterns in contact with a semiconductor are essentially just a bunch of Schottky diodes. Clearly, such assertion is not only factually incorrect (as discussed above) but is logically indefensible.

In summary, the vias (openings) of the Ruby reference do not and cannot anticipate the bonding pads (metallization patterns) of Claim 7. Accordingly, Claim 7 is not anticipated.

Claims 9, 11-12 depend, directly or ultimately, on Claim 7. The applicant respectfully submits that Claims 9, 11-12 are not anticipated by the Ruby reference for at least the same reasons for which the Ruby reference fails to anticipate Claim 7. See, e.g., *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

B. ARGUMENTS REGARDING THE REJECTION UNDER 35 USC 103(a)

Claims 8 and 10 were rejected under USC 103(a) as being unpatentable over the Ruby reference. The applicant respectfully traverses.

For a valid rejection under 35 U.S.C. 103(a), “[t]he **examiner bears the initial burden** of factually supporting any *prima facie* conclusion of obviousness.” MPEP 2142 (italic in the original; bold added). To establish a *prima facie* case of obviousness, three basic criteria must be met. **First**, there must be some suggestion or motivation to modify the

reference. **Second**, there must be a reasonable expectation of success. **Finally**, the reference, when modified, must teach or suggest all the claimed limitations.” *See, e.g., In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); MPEP 212 et seq. (emphasis added). “The mere fact that reference **can be** combined or modified does not render the resultant combination obvious **unless the prior art also suggests** the desirability of the combination.” MPEP 2143 citing *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) (Emphasis added). In fact, there must be a suggestion or motivation **in the reference** to do so.” *In re Mills*, 916 F.2d at 682, 16 USPQ2d at 1432 (emphasis added).

Here, the rejection is invalid for failing to establish the elements of a valid *prima facie* case of obviousness.

Firstly, there is no suggestion or motivation to modify the reference. The Ruby reference discusses neither electrostatic protection (ESD) nor formation of diodes, nor the use of bonding pads. Thus, there is no motivation to modify the Ruby reference to form a plurality of Schottky diodes of Claim 8. Further, there is no motivation to modify the Ruby reference to form bonding pads using the metals recited in Claim 10.

The examiner alleges that, to show motivation, “[a]ll that is required to show obviousness is that the claimed invention would have been made obvious by applying knowledge clearly present in the prior art. *In re Rosselet*, 347 F.2d 847, 146 USPQ 183 (CCPA 1965); *In re Sheckler*, 438 F.2d 999, 168 USPQ 716 (CCPA 1971); *In re Sovish*, 769 F.2d 738, 226 USPQ 771 (Fed. Cir. 1985).” Final Action, p. 4. Further, the examiner alleges that “[i]t would have been obvious for an ordinary artisan to modify Ruby to obtain the claimed invention since **forming a plurality of connections** with metal already used in the process would **reduce production time and cost**.” *Id* (bolded added).

The applicant respectfully submits that the proffered motivation is not present in the prior art. In the cited Ruby reference, there is no discussion of need to reduce production time. Further, in the cited Ruby reference, there is no discussion of need to reduce costs by forming connections. In fact, the discussion of the need to reduce cost occurs only once in the opening paragraph as the cost is related to the “size” and “continuing need for ever

smaller filter elements.” Ruby, column 1, lines 17-18. Thus, the assertion fails to meet the *In re Rosselet* test. Further, since there is no motivation in the cited reference, the first element of the *prima facie* case of obviousness is not met.

Secondly, since the Ruby reference fails to discuss electrostatic protection (ESD), formation of diodes, or the use of bonding pads, there is no expectation of success should the Ruby reference be modified to form a plurality of Schottky diodes of Claim 8 or should the Ruby reference be modified using the metals recited in Claim 10.

The examiner fails to address the second element of the *prima facie* case of obviousness. Further the examiner deems the applicant’s “discussion of ESD [as] irrelevant since the claims do not include this limitation.” *Id.* The applicant traverses for a number of reasons. For one, it is the examiner’s burden to establish the second element of the *prima facie* case of obviousness. Since it is not even offered, then the rejection is invalid on procedural grounds, and the discussion need not even reach the substantive issues. For another, it is only reasonable to conclude that there is no “reasonable expectation of success” where an objective of the invention (here, protection from ESD) is not even recognized in the prior art reference. Without recognizing the objective of the invention, one cannot assert that there is a “reasonable expectation of success” to realize the objective.

Finally, already discussed above, the Ruby reference fails to teach the formation of Schottky diodes. Thus, even if the Ruby reference is modified, the modified Ruby reference fails to teach all the elements of Claims 8 and 10.

In summary, failure to meet any one of the three elements of the *prima facie* case of obviousness is sufficient to invalidate the obviousness rejection. Here, the cited reference, even with the combination or modification as alleged by the examiner, fails to meet any of these elements.

IX. CONCLUDING REMARKS

As appellant has shown above, for numerous reasons, Claims 1-6 are allowable over

the cited references. In view of the foregoing, the appellant respectfully request that the rejection of Claims be reversed and the Notice of Allowance issued at an early date.

Respectfully submitted,



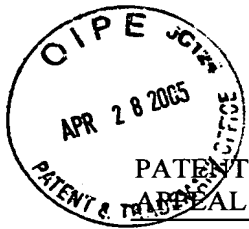
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Dated: 04/25/2005

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APPENDIX (CLAIMS)

(double spaced)

1. – 6. (previously cancelled)

7. (previously presented) A method for fabricating an apparatus, the method comprising:

 fabricating a thin-film resonator on a substrate; and

 fabricating a bonding pad connected to said thin-film resonator, a portion of

said bonding pad in contact with the substrate to form a Schottky diode.

8. (previously presented) The method recited in claim 7 wherein said bonding pad forms

 a plurality of Schottky diodes with the substrate.

9. (previously presented) The method recited in claim 7 wherein said bonding pad

 comprises a conductive material.

10. (previously presented) The method recited in claim 7 wherein said bonding pad

 comprises conductor selected from a group consisting of gold, nickel, and chrome.

11. (original) The method recited in claim 7 wherein said thin-film resonator comprises

 piezoelectric portion sandwiched by a bottom electrode and a top electrode.

12. (original) The method recited in claim 11 wherein the piezoelectric portion comprises

 Aluminum Nitride and said bottom and top electrodes comprises Molybdenum.